

# **Naval Surface Warfare Center Modeling and Simulation Master Plan**

**Prepared for  
Technical Director, NSWC**

**by the  
NSWC Modeling and Simulation Team**

**Ms. Marie Colitti-Howell, Dahlgren Division  
Mr. James Conway, Port Hueneme Division, Integrated Combat Systems Test  
Facility  
Mr. Scott Dorsch, Dahlgren Division, Coastal Systems Station  
Ms. Sharon Gable, Port Hueneme Division, East Coast Operations  
Mr. Pablo Lopez, Indian Head Division  
LCDR Dave Pearson, NSWC Headquarters  
Mr. Joe Stelling, Port Hueneme Division  
Mr. Rick Wilson, Crane Division  
Mr. Norm Yarbrough, Carderock Division**

**19 June 1997**



**NAVAL SURFACE WARFARE CENTER  
NAVAL SEA SYSTEMS COMMAND**

## **FOREWORD**

This NSWC Modeling and Simulation Master Plan was developed in response to the challenge to articulate a strategic vision for NSWC concerning Modeling and Simulation. It defines the scope of the initiative within the context of the overall view of Modeling and Simulation within and throughout the Divisions of NSWC. It is not intended to describe or define the current baseline of modeling and simulation capabilities and related programs in any detail.

Two years after its initial promulgation, this update is provided to continue the process of developing an integrated NSWC modeling and simulation capability supporting our products and responsive to our customers. This updated version will assist in focusing strategic planning and objective setting, and supporting the NSWC and the Naval Sea Systems Command objectives in the Modeling and Simulation arena as we prepare to meet the challenges of the 2000's.

Approved by:

Ira M. Blatstein  
Technical Director  
Naval Surface Warfare Center

## TABLE OF CONTENTS

Foreword.....	i
Introduction.....	1
Purpose.....	2
Background.....	3
External Environmental Drivers.....	3
NSWC Response.....	3
NSWC MaST Initiatives.....	4
Guiding Principles .....	5
The Vision.....	7
Roles, Relationships, Responsibilities.....	7
Opportunities and Challenges .....	7
Internal Relationships .....	7
External Relationships (Navy/OPNAV/PEOs/Joint).....	7
M&S Assets, Capabilities, Investments .....	8
People Assets .....	8
Capital Assets .....	8
The Strategy.....	9
Roles, Relationships and Responsibilities.....	9
Internal Relationships .....	9
External Relationships .....	9
M&S Assets, Capabilities and Investments.....	10
People Assets .....	10
Capital Assets .....	10
Plan of Action and Milestones .....	11
Near Term (FY97-FY99).....	11
Roles, Relationships and Responsibilities.....	11
Internal Relationships .....	11
External Relationships .....	12
M&S Assets, Capabilities and Investments.....	12
People Assets .....	12
Capital Assets .....	13
Plan of Action and Milestones .....	14
Far Term (FY00-FY06).....	14

## **INTRODUCTION**

There has recently been much attention given to modeling and simulation (M&S) within the DoD community. There is expectation that the development of common tools, methodologies and data bases, and the establishment of common inter-netting protocols will increase both the efficiency of model development and the effectiveness of model users. The Defense Modeling and Simulation Office has been established to guide progress to these ends.

The Naval Surface Warfare Center (NSWC), with a SECNAV assigned Leadership Area in surface warfare modeling and analysis, and with several defined Technical Capabilities involving M&S, has found it useful to articulate plans and objectives for its modeling and simulation in order to remain in the forefront in support to the Fleet. Accordingly, this Master Plan presents a Vision and a Strategy for NSWC Modeling and Simulation.

## **PURPOSE**

The NSWC Modeling and Simulation Master Plan (M&SMP) outlines the Naval Surface Warfare Center corporate strategy in implementing a coherent, overall coordinated initiative for M&S within the divisions of NSWC. The purpose of this plan is to provide guidance and general direction for management oversight and the development of NSWC M&S resources and to serve as an NSWC input to Naval Sea Systems Command M&S initiatives and a Navy M&S Master Plan.

The NSWC M&SMP applies to all Naval Surface Warfare Center Divisions, with the development and use of M&S from the planning and development through the life cycle.

The plan is intended to complement rather than replace NSWC Division directives/plans relating to NSWC, Navy and Joint applications of models and simulations. The plan will promote future coordinated developments and multi-Divisional use of M&S resources, with specific emphasis on Navy and Joint use where appropriate, as opposed to strictly single Division, single use applications.

Working toward those goals, the NSWC Modeling & Simulation Master Plan (M&SMP) provides background and guiding principles for NSWC M&S. It outlines a forward-looking “vision” for the corporate development and use of M&S within NSWC, and a strategy directing NSWC M&S toward future goals. Included is a framework for achieving these strategic goals, with measurable milestones, required investments and relative schedules to proceed.

In the context that it addresses future NSWC goals and strategies, the characterization provided in this plan is expected to evolve to keep pace with requirements to meet the needs for NSWC M&S as they evolve.

## **BACKGROUND**

### **External Environmental Drivers.**

The Department of Defense (DoD) Directive on Modeling and Simulation in 1992 established DoD policies, assigned roles and responsibilities, and established both a DoD Executive Council for Modeling and Simulation (EXCIMS) and the Defense Modeling and Simulation Office (DMSO).

Following this, a DoD Modeling and Simulation Initiative was developed, providing a broad perspective of modeling and simulation including potential applications and future directions perceived at the time. It defined a general vision and goals for M&S within DoD, and identified objectives and a plan of action.

These and other actions at the DoD level precipitated a Navy Modeling and Simulation Master Plan, and other evolutions all pointed toward increased emphasis on M&S coordination among DoD and Navy activities, promotion of the development and use of interoperability standards and protocols for M&S, and the ultimate goals of using M&S as key elements in the acquisition process.

### **NSWC Response.**

Prompted by the realization that a more integrated application of models and simulations can bring significant benefits to the Warfare Center, a series of simulation teaming meetings were initiated at the request of the NSWC Technical Director in late 1992. The initial intention was to: a) provide a forum for exchange of M&S information within NSWC Divisions; b) attempt to determine if there were duplicative M&S efforts on-going; and c) explore opportunities for inter-division M&S teaming efforts in the future where appropriate.

The first few meetings were concerned mainly with exchanging information on M&S activities each division was engaged in and determining if there was a realistic need for such a group in the future. In the course of these early meetings, the name NSWC Modeling and Simulation Team (NSWC MaST) was adopted. Additionally, ideas were

exchanged on concepts for goals and objectives for the group and how it could contribute to the overall mission of NSWC.

### **NSWC MaST Initiatives**

As characterized in “A Briefing Paper for NSWC Executive Directors” dated November 1993, MaST progress had been demonstrated on three general levels: Familiarization, Information Compilation and Articulation, and Corporate Vision and Strategy.

- **Familiarization** was necessary to develop a strong rapport and growing mutual understanding among the divisions of the NSWC capabilities and resources involved in M&S.
- **Information Compilation and Articulation** of on-going efforts was intended to develop and compile an NSWC Simulation Catalog, and to provide a similar input to the Navy Simulation Catalog being compiled by the Department of Navy M&S Management Office. Such information would be kept within the Warfare Center.
- **A Corporate Vision and Strategy** was considered useful to promulgate an NSWC M&S statement of intent and overall guidance.

MaST has embarked on efforts such as this plan, as input toward those goals. MaST will be the principle agent of NSWC responsible for the execution of the M&SMP. The NSWC M&SMP is conceptually one of the key building blocks in the framework supporting and shaping NSWC's corporate view of how it sees the outside world, and how the world visualizes NSWC. To meet the challenges posed by future fleet requirements, a view toward total ship design and integration, consistent with NAVSEA M&S initiatives, is an absolute need. A corporate Center voice and position on the development, use, and exportation and/or sharing of M&S resources within NSWC to meet these challenges is required.

The NSWC M&SMP is intended to provide the guidance toward an M&S team focus for models and simulations which may have impact on total ship design, integration, acquisition and readiness, and on the continued move toward interoperability and reusability of models and simulations within the Center, NAVSEA, the Navy, and the Joint Community.

## GUIDING PRINCIPLES

Any vision or strategy for the future must of necessity be guided, shaped and molded by basic, coherent precepts that can be defined, clearly identified, and readily applied. With that in mind, the following basic tenets were developed by MaST in consultation with the NSWC Technical Director. They are guideposts of this M&SMP.

1. The overall vision and strategy should **be general in nature**, and at the same time **specific enough to be executable and measurable**. It must contain basic milestones with charted, general directions evident but not confining.
2. It should **address the full spectrum of M&S**, from concept formulation, through development and life cycle, including employment and use. System and operational simulation, cost and operational performance analysis, and logistics analysis is included, with a scope ranging from individual operator to force level. It must address the appropriate application of models and simulations.
3. It should actively **project an NSWC philosophy that is forward-thinking** in nature, clearly concentrating its resources on assisting the naval warfighter of the future. To this end, increased emphasis on improvements in the interoperability and reusability of simulations must be paramount.
4. A Center M&S vision, by its very nature, must address the future. It should **work toward total ship systems engineering, and total ship integration**, with commitment toward open systems architectures in all new M&S efforts.
5. It should **focus on strengths of the Warfare Center**, emphasizing their attributes, and show how they can be used as building blocks for the future. Past successes should be highlighted, particularly those that clearly demonstrate lessons learned and ones that lay foundations for future growth consideration.
6. A Center vision must **provide a climate of trust** between Warfare Center Divisions which can be built upon and **used to promote teaming**. It should seek out teaming opportunities where opportunities present themselves, exploit them to a maximum, and advertise and highlight the associated value-added features.



7. It should **foster and promote a common teaming strategy** among the Divisions of the Warfare Center to best respond to our customers' needs. Such a strategy must be proactive by all parties, with collaboration among divisions and with efficiency and sharing of M&S resources of prime importance. It must deal with and ameliorate cultural changes and differences concerning development, use and reuse of M&S resources.
8. It should **contain the framework by which technical and cultural challenges**, both present and future, **are directly addressed and utilized to advantage** by coordinated efforts of Center M&S projects and their managers. Such challenges may originate within the Warfare Center or from outside sources. Provisions to meet such challenges should be readily discernible.
9. An NSWC plan for M&S should **identify clearly the M&S core capabilities** of the Warfare Center, and provide **a planned approach toward strengthening those capabilities** required to meet the future. Effective use of unique M&S core capabilities, and using them efficiently in responding to needs of the Navy while improving on processes involved should be stressed continuously.
10. In today's budget environment, and considering "neckdown" and "right-sizing" evolutions, there exists the absolute need to **promote the sharing and transportation** where appropriate, of M&S capabilities on inter-division as well as Navy-wide and DoD levels.
11. **Education** in the efficient, appropriate use and exploitation of M&S **must be emphasized** on a continuous basis. Dissemination of information on capabilities, technologies and simulation concepts is crucial, as it can directly affect and impact operational systems in their development, acquisition and use.
12. A forward-looking vision should recognize the requirement to provide some level of **support to the Navy M&S infrastructure**. It should **promote a proactive role** for Center participation **in Navy, Joint and Allied M&S** efforts such as Distributed Interactive Simulation (DIS), joint service/Allied wargames and exercises, and DMSO sponsored activities such as JWARS, JMASS and JSIMS. The Warfare Center should project a presence in Navy M&S activities.

## THE VISION

### **Roles, Relationships, Responsibilities**

#### ***Opportunities and Challenges***

Each of NSWC's five Divisions has historically had outstanding modeling and simulation capability over a broad range of technical areas. These capabilities were developed and flourished in a less constrained entrepreneurial culture where models and simulations were tailored to support individual projects within each local organization. The restructuring and consolidation of Navy Warfare Centers has provided new opportunities and challenges to this NSWC M&S community.

**The NSWC M&S community will move from the outlook and processes of the old culture to a new one of Center level teaming, sharing and planning.** We recognize that the consolidations, restructuring, and reorganizations have resulted in mission/ expertise/asset mismatches among the NSWC Divisions, some within the M&S community. Resolution of these mismatches have significantly diminished will still require attention. The early benefits of the NSWC M&S community to function as a Center team are evident and serve as a foundation for future teaming initiatives.

#### ***Internal Relationships***

**We will apply pragmatic work arounds, forming inter-Divisional project teams that emphasize cooperation and the exploitation of past successes and current capabilities with an allocation of responsibility that is responsive to the current delineation of respective missions.** This Master Plan represents a corporate focus and a culture of inter-Divisional cooperation and the basis of corporate M&S policies, strategies, and plans based on elimination of unnecessary duplication and on the sharing of M&S resources inter-Divisionally to ensure a fully integrated environment.

#### ***External Relationships (Navy/OPNAV/PEOs/NAVSEA/Joint)***

**The NSWC M&S community will form a coordinated effort for developing new sponsorships within the Navy and in the Joint arena.** This requires that members have current familiarity with NSWC Center wide M&S capabilities. The MaST will be responsible for ensuring that the community maintains this perspective, using such means as an M&S portfolio, MaST brochure, annual MaST status reports and MaST informational

briefings. Key individuals will be identified as points of contact representing Divisions' areas of M&S expertise and who will assist in and facilitate the formation of M&S related marketing and project teams.

### **M&S Assets, Capabilities, Investments**

In order for NSWC to retain its preeminent position in modeling and simulation in the current volatile environment, we must aggressively retain, optimize, and nurture our core corporate assets and capabilities while prudently investing to build for the future.

**Corporate M&S strategies will be formulated and planning conducted in the context of the Center capabilities and needs.**

#### ***People Assets***

Ultimately the value of any organization, and the contribution it makes, is a direct function of the talent and motivation of its people. Any long term expectation of retaining expertise, including modeling and simulation, will require investing in its work force. **The Center M&S community will develop close professional ties among the Divisions to foster exchange of ideas, teaming, consultation and building of expertise.**

#### ***Capital Assets***

(a) Non-Networked M&S Assets - **Investments will be directed to retain leadership in key M&S capabilities:** warfare analysis; combat system design, test, engineering; weapon and littoral warfare systems; ship and submarine design, development and test. The total spectrum will be addressed: R&D, T&E, ISE and training support. NSWC covers every aspect of the M&S pyramid from physics based models to system performance to theater level to campaign level.

b) Corporate Distributed Simulation - **A network will be developed interconnecting the M&S facilities between and within the Divisions and other Government activities as required and with other Navy and DoD facilities to support acquisition process, test, training.** Investments will focus on producing inter-operable M&S assets building on the capabilities of the Multi-warfare Analysis and Research Simulation (MARS), Battle Force Tactical Training (BFTT), AEGIS Computer Center (ACC), AEGIS Combat System Center (ACSC), FCDSSA/ICSTF Combat System Simulator (CSS), Tomahawk Functional Ground Testing (FGT), Naval Mine Simulation Program (NMSP), Leading Edge Advanced Prototyping of Ships (LEAPS), etc.

## **THE STRATEGY**

### **Roles, Relationships and Responsibilities**

#### ***Internal Relationships***

1. Establish MaST as the vehicle for building trust and changing the culture:
  - a. Make regular reports of M&S opportunities and teaming activities.
  - b. Resolve mission/asset/capability mismatches through innovative teaming strategies (consistent with BRAC).
2. Assertively foster two-party joint ventures and, where appropriate, drive teaming to three and four party teams:
  - a. Increase M&S teaming projects across Divisions as measurable by numbers of projects, funding level, etc..
  - b. Periodically publicize activity.
3. Headquarters promote teaming efforts and cultural change:
  - a. Promulgate M&S Master Plan.
  - b. Acknowledge NSWC successes.
  - c. Advertise successes outward.
  - d. Advertise NSWC successes at each site.

#### ***External Relationships***

1. Develop Center level Customer Service Plan:
  - a. Identify programs and offices to brief.
  - b. Identify unmet customer needs.
  - c. Develop and execute courses of action.
2. Maintain visible role in NAVSEA, Navy and DoD M&S activity:
  - a. Provide NSWC membership in Navy M&S policy, management, and technical bodies.
  - b. Provide technical NSWC level leadership in key DMSO activities.
  - c. Provide leadership in professional and industrial associations.

## **M&S Assets, Capabilities and Investments**

### ***People Assets***

1. Make People Connections:
  - a. Identify key M&S capabilities for each Division.
  - b. Identify key points of contact for each capability, use as basis for teaming, etc..
2. Foster Exchange of Ideas, Community Involvement:
  - a. Hold annual NSWC M&S workshop to exchange technical papers.
  - b. Provide annual briefing of M&S activity.

### ***Capital Assets***

1. Non-Networked Investments:
  - a. Identify current status of assets in key M&S capabilities.
  - b. Fund through sponsorships and internal investments the growth and enhancement of models and simulations within these core capabilities.
  - c. Promote Center level recognition and use of Divisions' unique M&S assets.
2. Centerwide Networked Investments:
  - a. Utilize e-mail and other connectivity to connect teams for planning, managing, consulting, etc..
  - b. Establish distributed networking capability to support remote model development and use.
  - c. Establish distributed simulation network via sponsorships and internal investments, building on MARS and NMSP for analysis and CSS and BFTT for testing and training.

## PLAN OF ACTION AND MILESTONES

### NEAR TERM (FY97-FY99)

This section enumerates the tactical plan to execute the strategy outlined in the previous section. The objectives and task enumeration coincide with those of the strategy. The Cost column contains estimates of indirect, or unallocated funding to execute the plan.

#### **Roles, Relationships and Responsibilities**

##### ***Internal Relationships***

Objective	Task	Milestones	Measures	Lead	Cost
1	a	Report at each MaST Meeting, start October 1994	Documented in MaST meetings, minutes and annual report	MaST Chair	\$0
	b	Identify and resolve M&S mismatches. ONGOING  Report findings in annual report	Report of findings	NSWC Headquarters Lead	\$0
2	a	Identify and foster M&S teaming efforts within NSWC. ONGOING  Maintain database of these efforts.  Publish results in annual report	Number of teaming ventures.  Total benefit of teaming ventures  Divisions participating in ventures	MaST Chair/ Vice Chair	\$50k annually
	b	Prepare annual report to NSWC, start April 1997	Published report	MaST Chair/ Vice Chair	\$5k annually
3	a	Biannual review, buy-in and promulgation of Master Plan upon approval	Formal release of Master Plan	NSWC Technical Director	\$0
	b	Place Report (2b) on Board of Directors Meeting Agenda  Letters of acknowledgment to teaming participants of successful ventures	Number of occasions of acknowledgments	NSWC Headquarters	\$0
	c	Brief M&S Activity at public forums	Number of occasions	NSWC HQ/ MaST Chair	\$0
	d	Place Report (2b) on Site Board of Directors Meeting Agenda	Number of occasions	MaST members	\$0

### ***External Relationships***

<b>Objective</b>	<b>Task</b>	<b>Milestones</b>	<b>Measures</b>	<b>Lead</b>	<b>Cost</b>
1	a	Identify programs and offices to brief  Prepare briefings tailored to program/office.	List of programs/offices  Briefing packages	MaST members	\$2k
	b	Identify opportunities and unmet customer needs  Develop POA&M for NSW participation	Number opportunities and needs identified  Number of POA&M packages	MaST members  MaST members involved in effort	\$0
	c	Brief programs/offices	Number of briefings given	MaST Chair /Vice Chair	\$10k annually
2	a/b	Identify M&S leadership  Support NSW HQ queries	List of activities, POC in Annual Report	MaST Chair /Vice Chair	\$0
	c	Contribute to technical work of Professional Societies	List support in Annual Report	MaST members involved in effort	\$0

### **M&S Assets, Capabilities and Investments**

#### ***People Assets***

<b>Objective</b>	<b>Task</b>	<b>Milestones</b>	<b>Measures</b>	<b>Lead</b>	<b>Cost</b>
1	a/b	Identify key personnel capabilities, updated annually  Identify key people, updated annually	Published lists	MaST Chair	\$5k
2	a	Hold annual NSW workshop, first not before 1998	Successful workshop	NSWC Headquarters Lead	\$100k annually, start 1997
	b	Publish annual report	Successful annual reports	MaST Chair	\$2k

### ***Capital Assets***

<b>Objective</b>	<b>Task</b>	<b>Milestones</b>	<b>Measures</b>	<b>Lead</b>	<b>Cost</b>
1	a	Identify M&S Assets, updated annually	Report	MaST members	\$2k
	b/c	Develop plan of action, execute plan, updated annually	Plan of Action	MaST members	TBD
2	a/b/c	Inventory current NSW projects using distributed processing, updated annually  Publish results in annual report	Agenda item to discuss	MaST Chair	\$0



## **PLAN OF ACTION AND MILESTONES**

### **FAR TERM (FY00-FY06)**

The far term plan cannot be fully formulated until the near term efforts develop a direction. MaST feels that the teaming efforts across the divisions are proving fruitful and successful, and are forming a strong and active M&S community within the Center. It is the intention of the MaST that much of the effort contained in the Strategy will be direct funded and will require minimal capital investment by NSW. However, funding from NSW is necessary for the continued success of the MaST. It is the intention of the MaST to prepare a summary of accomplishments and funding requirements each fiscal year and present these to NSW management.

This plan of action should be reviewed annually to determine whether a meaningful far term plan can be developed.